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SMOKING BEHAVIOR AMONG US NAVY ENLISTED MEN: SOME  
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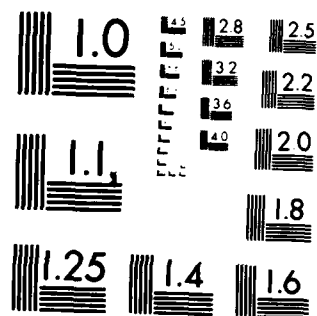
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# SMOKING BEHAVIOR AMONG U.S. NAVY ENLISTED MEN: SOME CONTRIBUTING FACTORS

R. G. BURR

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Smoking Behavior Among U.S. Navy Enlisted Men:  
Some Contributing Factors

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\*Environmental Medicine Department

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## Summary

### Problem

Health risks for naval personnel are many and varied. Considerable research evidence supports the conclusion that one such hazard is cigarette smoking. Because the rate of smoking in the Navy reportedly is quite high, steps should be taken to identify factors that may discourage smoking in order to develop techniques and programs that can reduce this hazardous activity.

### Objectives

The purpose of this study was (1) to identify measures that distinguish nonsmokers from smokers, (2) to use these measures to develop approaches for lowering smoking incidence, and (3) to recommend procedures that would encourage cessation of smoking among Navy personnel who smoke.

### Approach

A sample of 505 deployed Navy enlisted men volunteered to respond to an extensive questionnaire evaluating perceptions of ship habitability. Nonsmokers (N = 143) and smokers (N = 362) were identified based on their response to a single item, "Do you smoke?" Multiple discriminant analysis was used to determine differences between the two groups on such measures as locus of control, perceptions of stress at the job, organizational, and family levels, and peer influence.

### Results

Nonsmokers were found to be more internal on the locus of control scale and to experience less stress at the job and family levels than smokers. Distinctions between nonsmokers and smokers on the organizational stress and peer influence measures were not found. The proportion of variance accounted for by all predictors was low, as indicated by the canonical correlation squared ( $R^2_c = .05$ ).

### Conclusions

The smoker in this study was more likely to perceive that he does not control his own fate, and he experienced more stress in relation to the job and family than the nonsmoker. Perceptions of organizational stress did not differentiate between nonsmokers and smokers; perhaps organizational influences are more remote than those related to the job or family. Peer influences were not clearly demonstrated; perhaps by the time an individual is assigned to a ship and a workgroup smoking behavior has been established. Peer influence may be more evident earlier in the naval career, such as during recruit training.

Because of the small proportion of variance accounted for when using the personality, stress, and peer measures to distinguish between nonsmokers and smokers, suggestions based on these measures for lowering the incidence of smoking may not be successful. Other procedures that could be considered would be to ask those in the Chain of Command to set a no-smoking example, to discontinue smoking breaks for Naval personnel, and to eliminate the military discount on purchase of cigarettes.

### Recommendations

More detailed analyses of the precipitating factors involved in choosing to smoke cigarettes is needed as well as close examination of the effects of the Navy's Health and Physical Readiness Program on cigarette smoking.

## Smoking Behavior among U.S. Navy Enlisted Men:

### Some Contributing Factors

It has been said that humans are the only animal who volitionally engage in self-destructive behavior (i.e., overeating, smoking, suicide, excessive use of alcohol and/or drugs). Perhaps the most prevalent of these behaviors is cigarette smoking. It has been estimated that there are more than 50 million smokers in the U.S., and despite the warning "cigarette smoking is dangerous to your health" and the banning of cigarette commercials from television, the tobacco industry continues to flourish. The American Cancer Society estimates that cigarette smoking is responsible for 325,000 early deaths each year for diseases of the lung, heart, and circulatory system and that about 90% of lung cancer cases are related to smoking (HEW, 1977). As the Surgeon General of the Navy has summarized from a World Health Organization report, the control of cigarette smoking alone could do more to improve health and prolong life in developed countries than any other single action in the field of preventive medicine (Arentzen, 1978).

The incidence of smoking among U.S. Navy personnel has been observed to be very high (Arentzen, 1980; Hoeffler, 1980). Recently the Chief of Naval Operations has issued OPNAV Instruction 6110.1B which mandates a Health and Physical Readiness Program. This program is designed to promote a number of health objectives including smoking cessation.

In examining factors associated with smoking behavior, previous research has utilized locus of control (Best & Steffy, 1971; James, Woodruff, & Werner, 1965; Lichtenstein & Keutzer, 1967; Straits & Sechrest, 1963) which is a personality construct derived from social learning theory (Rotter, 1954) to account for expectancy of reinforcement. Individuals who view reinforcements as contingent on their own behavior (internals), as contrasted with those who perceive reinforcements as a result of chance, luck, or powerful others (externals), are more likely to engage in behaviors that promote physical well being. On the basis of this premise, nonsmokers should be more internal than smokers; however, the results have been somewhat contradictory.

In addition to this personality variable, there are situational elements that may contribute to smoking. Schacter, et al. (1977) studied the relationship between stress and smoking under conditions of low and high stress imposed by electric shock. Smokers in high-stress conditions smoked more than those in low-stress conditions. Further, MacArthur, Waldron, and Dickinson (1958) reported that half of the smokers in their study reported that they smoked more when under pressure. Another factor associated with smoking behavior is peer pressure. The Navy, as well as all branches of the Military, emphasizes a spirit of camaraderie; therefore, it is possible that some individuals smoke because many of their friends are smokers (Clarke, MacPherson, & Holmes, 1982; MacArthur, et al., 1958).

To ensure success of the Health and Physical Readiness Program in the area of smoking cessation, the Navy must know what influences are at work in initiating and maintaining smoking behavior. In order to explore possible influences associated with the high incidence of smoking among Navy enlisted men, several potential contributing factors were examined in smoking and nonsmoking groups. Included were measures of (a) locus of control--to assess whether smokers viewed their actions as being controlled predominantly by themselves or predominantly by chance, luck, or powerful others; (b) stress--to assess whether smokers experienced more stress at the job, organizational, and/or family levels; and (c) peer pressure--to assess whether smokers perceived their workgroups as friendlier and more cooperative workgroups. Specifically, it was hypothesized that: (a) Nonsmokers would be more internal than smokers; (b) smokers would view their behavior as being affected more by chance than nonsmokers; (c) nonsmokers would report experiencing less stress at job, organizational, and family levels, and (d) smokers would report a

higher degree of cooperation and friendliness within the workgroup.

#### Method

##### Participants

Participants of this study included 505 Navy enlisted men who were deployed on three U.S. Navy amphibious assault ships in the Western Pacific. The study was intended to evaluate relationships between crewmembers' ship habitability perceptions and subsequent morbidity. Participation was endorsed by the Command and approximately 75% of each ship's crew volunteered. The mean values for age, education level, length of service, and paygrade were 22.6 yr., 11.8 yr., 3.9 yr., and E-3, respectively.

##### Measures

Responses to an extensive 303-item questionnaire, designed to measure different aspects of the shipboard environment, were obtained. These items were organized into 63 apriori composites; 11 of these measures were used in the present study. Smoking behavior was rated by a single item which asked "Do you smoke?" Response choices were presented in a five-point Likert format and ranged from "never" to "almost always."

Personality characteristics were evaluated using Levenson's (1973) multidimensional Locus of Control Scale which consists of three subscales assessing Internal, (8 items;  $\alpha = .56$ ) Chance (8 items;  $\alpha = .73$ ) and Powerful/Other, (8 items;  $\alpha = .74$ ) orientations. The 24 items were presented in a six-point Likert format; response categories ranged from "strongly disagree" to "strongly agree." Previous research has demonstrated the validity of this multidimensional construct for predicting job and health-related criteria in two independent samples of Navy enlisted men (Butler, & Burr, 1980).

Stress was considered at three levels: job, organization, and family. Job level stress measures included Role Ambiguity (6 items;  $\alpha = .65$ ), which reflected the degree of incompatible job demands, and Role Conflict (5 items;  $\alpha = .61$ ) which assessed the degree of clarity of job demands. Organizational Ambiguity (3 items;  $\alpha = .52$ ) and Organizational Conflict (5 items;  $\alpha = .55$ ) evaluated stress due to incompatible demands and degree of clarity of demands at the organizational level. Also at the organizational level, Leadership Support (5 items;  $\alpha = .84$ ) addressed supervisor behavior that increased subordinates' feelings of importance and personal worth. Stress at the family level was measured by Family Strain (5 items;  $\alpha = .60$ ) which explored hardship to the crewmember because of extended absence from the family.

The peer measures included Workgroup Cooperation (4 items;  $\alpha = .76$ ) measuring the perceived degree of cooperation that existed in getting the job done, and Workgroup Friendliness and Warmth (3 items;  $\alpha = .73$ ) reflecting trust, friendliness, and communication within the workgroup. Responses for each of the stress and peer composites were presented in a five-point Likert format and had been developed in previous investigations of naval and civilian personnel (Butler, & Burr, 1980; Jones, & James, 1979). Table 1 shows the variable categories with a representative item from each of the constructs.

##### Analyses

Percentages of responses to the question "Do you smoke?" included: Never - 28.3%, Rarely - 6.3%, Sometimes - 10.3%, Often - 28%, and Almost Always - 27%. In the first phase of data analysis, the sample was divided into participants who responded "Never" to the smoking item ( $N = 143$ ) and those who responded "Rarely" through "Almost Always" ( $N = 362$ ). This dichotomous grouping was chosen because it was felt that the responses "Rarely" or "Sometimes" were not so discriminative as to delineate a moderate smoking group, and because the purpose of the study was to compare smoking and nonsmoking participants. Next, the two groups were compared by multiple discriminant analysis (MDA) which is a statistical procedure designed to distinguish between two or more groups. The MDA was used because the various measures (e.g., Role Ambiguity and Role Conflict) were intercorrelated. Thus, the

Table 1

Construct Categories with a Representative Item

Personality Related

Internal - I can pretty much control what will happen in my life.

Chance - To a great extent my life is controlled by accidental events.

Powerful Other - What happens in my life is mostly determined by powerful people.

Stress Related

Role Ambiguity - My job responsibilities are clearly defined.

Role Conflict - The amount of work I have to do interferes with how well it gets done.

Organizational Ambiguity - How clearly defined are the objectives of this ship?

Organizational Conflict - Rules and regulations often get in the way of getting things done.

Leadership support - To what extent does your supervisor pay attention to what you say?

Family Strain - How often does your job interfere with your family life?

Peer Related

Workgroup Cooperation - The people I work with cooperate to get the job done.

Workgroup Friendliness - To what extent does a friendly atmosphere exist among most of the members of your workgroup?

standardized discriminant function coefficients could be used to assess the degree of multicollinearity, or interdependence, among the measures and thereby assist in identifying between-group discriminating variables. Results of this analysis will identify those measures that differentiate smokers from nonsmokers.

Results

The results provided by the MDA and the univariate  $F$  tests for each measure are shown in Table 2. The discriminant function obtained was significant ( $\chi^2 [1] = 24.9, p < .01$ ); the canonical correlation squared ( $R^2_c$  for this function was .05). Inspection of the univariate  $F$  ratios in Table 2 indicated that the measures Internal, Role Conflict, and Family Strain contributed to the between-group differentiation. These findings must also be interpreted with attention paid to the standardized discriminant function coefficients. These weights may be used to define the direction and relative importance of each variable with respect to the function. When these values are considered, it can be seen that most of the between-groups discrimination was explained by the measures of Role Conflict (discriminant weight of  $-.67$ ), Internal ( $.34$ ), and Family Strain ( $-.37$ ). In terms of these variables, nonsmoking crew members could be characterized as more internal than smokers and as experiencing less stress at the job and family levels.

Table 2  
Standardized Discriminant Function Coefficients, Means, Standard  
Deviations, and Univariate F - Tests for Smokers and Nonsmokers (N=505)

Measures	Standardized Discriminant Function Coefficients	Smokers (N=362)		Non-Smokers (N=143)		F <sup>a</sup>
		M	SD	M	SD	
Personality Related						
Internal	.34	35.42	5.39	36.77	5.41	6.44*
Chance	-.29	24.16	6.77	23.27	7.18	1.71
Powerful Other	.27	26.29	7.42	25.80	7.29	.45
Stress Related						
Role Ambiguity	.18	15.62	3.49	15.29	3.80	.85
Role Conflict	-.67	15.40	2.89	14.46	2.92	10.73**
Organizational Ambiguity	.16	8.15	2.09	8.10	1.97	.06
Organizational Conflict	.15	15.95	2.82	15.62	3.02	1.38
Leadership Support	.08	14.07	3.92	14.67	4.02	2.37
Family Strain	-.37	14.82	3.86	13.87	3.87	6.18*
Peer Related						
Workgroup Cooperation	.56	12.85	3.08	13.40	2.92	3.42
Workgroup Friendliness	-.62	10.46	2.37	10.44	2.47	.01

<sup>a</sup>df = 1,503

\*p < .05

\*\*p < .01

#### Discussion

Current findings are discussed in terms of the four hypotheses of the study. The first hypothesis, that non-smokers would be more internal than smokers, was confirmed. This finding is consistent with the past studies that have reported a relationship between internality and nonsmoking (Clarke, et al., 1982; James, et al., 1965; Straits and Sechrest, 1963). The finding that nonsmokers are more internal than smokers suggest that internally-oriented individuals, feeling that they have control over the reinforcement in their life, choose not to smoke perhaps because of the associated health hazard. Support for this conclusion is presented in a study by Strait and Sechrest (1963) which found that males who believed the Surgeon General's report and quit smoking were more internal than those who believed the report but did not quit smoking.

The second hypothesis, that smokers would view their behavior as being influenced by chance expectancies, was not confirmed by the univariate F ratios; however, the discriminant function coefficients shown in Table 2 reveal a difference between the groups in the expected direction. That is, chance had a negative function coefficient of a similar magnitude but in the opposite direction of that associated with internality. Thus the conclusion that smokers may smoke because of beliefs such as "when your time comes it comes" or "whatever will happen will happen" is supported at the multivariate level. Several studies have reported a similar relationship between smokers and chance expectancies (Clarke, et al., 1982; James, et al., 1965; Straits and Sechrest, 1963; Wallston & Wallston, 1978).

The third hypothesis, nonsmokers would experience less stress, was only partially confirmed. Role Conflict was the best predictor of smoking behavior related to job stress; Role Ambiguity did not contribute to between-group discrimination. The meaning of this difference is seen more clearly when the appropriate partial correlations

are examined. In the case of role ambiguity and smoking, the correlation .03 was reduced to -.04 when the effects of role conflict were partialled out. Partialling role ambiguity from the role conflict-smoking relationship, the correlation (.14) was unchanged (McNemar, 1969). Thus, it is seen that the majority of influence is directly attributable to role conflict and not to role ambiguity. Significantly more family strain was reported by smokers, but the organizational stress measures did not differentiate between smokers and nonsmokers. Perhaps perceptions of organizational stress are more remote and have less effect than perceptions of job conditions and family separation.

Finally, the hypothesis that smokers would report a higher degree of cooperation and friendliness within the workgroup was not supported by the results of the univariate *F* ratios. Examinations of the magnitude of the standardized discriminant function coefficients revealed a separation between the two measures. At first glance this may seem contradictory, but a closer inspection of the individual items in each composite may explain this result. The Workgroup Cooperation composite is specific to getting the job done; Workgroup Friendliness, on the other hand, emphasizes a friendly atmosphere and trust among crewmembers. If peer relationships do affect smoking behavior, one then would expect smokers to be higher in Workgroup Friendliness but not necessarily higher in Workgroup Cooperation. That is, smoking and getting the job done are not as compatible as smoking and friendliness. An alternative consideration is that the workgroup is not the appropriate situation in which to assess peer influences on smoking behavior. It may be that by the time an individual is assigned to a ship and workgroup, smoking behavior is already established; a more appropriate time to study peer relations and smoking may be during recruit training.

An additional point should be mentioned; a potential improvement in the current study would have been to assess more than just "Do you smoke?" Rather, a more sensitive measure, such as "How much do you smoke?" may have provided more pronounced relationships, especially with the stress and peer measures. The small amount of variance accounted for in this study would perhaps be increased with a more sensitive measure of smoking behavior.

As mentioned, the incidence of smoking in the Navy is very high. Survey data from this laboratory has shown, in independent samples, that 67% of 914 and 78% of 5153 enlisted men reported that they smoke. In the present study 72% of the 505 enlisted men questioned reported that they smoked; this statistic is alarming when compared to the national average at the time this study was conducted (1977), for males in a similar age group (21-24), where the incidence of smoking was 41% (HEW, 1977).

While the present study does not address causality, the results suggest that the smoker is an individual who is not convinced that he controls his own fate and that stress at the job and family level may contribute to smoking. In specifically addressing the three measures that were found to distinguish between smokers and nonsmokers, the Navy cannot eliminate job stressors such as role conflict in order to lower the incidence of smoking, and the fact of family separation is an unavoidable part of Navy life. Concerning locus of control, the Health and Physical Readiness Program is a step in the right direction toward promoting a more internal orientation among Navy personnel. The program sets certain physical standards of performance and recommends participation in physical exercise by stating "individuals should exercise on a regular basis three times a week for approximately 30 minutes." Physical fitness testing may prove to be an indirect teacher of internal control in that personnel may learn about and change their physical capabilities through an exercise program and thereby learn that they can control their own fate. The Health and Physical Readiness Program might be more beneficial than an educational program simply designed to point out the health hazards of smoking, which probably are already well known.

It must not be overlooked that only a small portion of the variance was accounted for by the personality, stress, and peer measures. While the results were generally consistent with the hypotheses, the preceding recommendation for changing smoking behavior by encouraging a change in personality characteristics may not be effective.

The Surgeon General of the Navy has endorsed programs to decrease tobacco smoking and has urged that "health care professionals refrain from the purchase or use of cigarettes when around patients" (Arentzen, 1978). This suggestion could be expanded from health care professionals to include Commanding Officers, Executive Officers, Company Commanders, and even Department Heads. As mentioned, the Chief of Naval Operations has begun a program to discourage smoking which includes rewards for those who quit. Other suggestions to discourage smoking are to discontinue the practice of giving smoking breaks as a reward during hard or prolonged work details and to discontinue the lower prices for cigarettes onboard ships. Though these actions may not be greeted with much enthusiasm, the high incidence of smoking in the Navy may decrease. The service must assume responsibility for discouraging the continuation of this dangerous habit.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  Factors contributing to the high incidence of smoking in a sample of 505 U.S. Navy enlisted men were examined. Levenson's (1973) multidimensional locus of control scale was used to assess personality differences between smokers and nonsmokers. Also measured were perceptions of stress and peer relationships. It was hypothesized that nonsmokers would be more internal, less chance oriented, report less stress, and perceive less positive peer relationships than smokers. The results generally supported the first three hypotheses.		

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but did not support the fourth. It was suggested that programs to promote internal expectations, such as the Navy's Health Readiness Program, may be a method of lowering the high incidence of smoking. Because of the low proportion of variance accounted for, more immediate and perhaps more salient solutions mentioned were: (1) encourage those in the chain of command to set a no-smoking example, (2) stop the practice of giving work breaks for smoking, and (3) discontinue military price discounts on cigarettes.

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